0043663 PAGE

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 629920

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	3a. USQ Required?	4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	John H. Baldwin, Data Assessment and Interpretation, R2-12, 373-4533	[] Yes [X] No	03/18/96
	5. Project Title/No./Work Order No. Tank 241-BY-108	6. Bldg./Sys./Fac. No. 241-BY-108	7. Approval Designator N/A
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-ER-533, Rev. 0	9. Related ECN No(s). N/A	10. Related PO No. N/A

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

This ECN was generated in order to exchange the following pages: ES-3, ES-8, 2-5, 4-4, 5-3, 5-5, 5-6, 5-9, and A-103.

3-19-96 AE Young

12345678910111213141516171819202122232425262728293031 APR 1996 RECEIVED EDMC

13a. Justification (mark one)

Criteria Change	[]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[X]

13b. Justification Details

Revision needed due to drawings having been switched and minor corrections to statistical information.

14. Distribution (include name, MSIN, and no. of copies)

See attached distribution.

RELEASE STAMP

DATE: MAR 25 1996 HANFORD RELEASE

STA: 4 ID: 2

A-7900-013-2 (11/94) GEF095

A-7900-013-1

ENGINEERING CHANGE NOTICE	Page 2 of 2	1. ECN (use no. from pg. 1) ECN-629920

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	Tickler File	[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog. Eng. J.H. Baldwin *John Baldwin*	3/18/96	PE	
Cog. Mgr. J.G. Kristofzski *[signature]*	3/19/96	QA	
QA		Safety	
Safety		Design	
Environ.		Environ.	
Other		Other	
		DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature	
		ADDITIONAL	

Tank Characterization Report for Single-Shell Tank 241-BY-108

John H. Baldwin
Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

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STA: 4
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RECORD OF REVISION

(1) Document Number	
WHC-SD-WM-ER-533	Page 1 of 1

(2) Title
Tank Characterization Report for Single-Shell Tank 241-BY-108

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
0	EDT-615354.		
Rev. 0A RS	(7) These pages have been corrected as per ECN 629920: ES-3, ES-8, 2-5, 4-4, 5-3, 5-5, 5-6, 5-9, A-103	John Caldwell 2/18/96	John Kristofzski 3/1/96

WHC-SD-WM-ER-533
Revision 0A

Tank Characterization Report for Single-Shell Tank 241-BY-108

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Date Published
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Prepared for the U.S. Department of Energy
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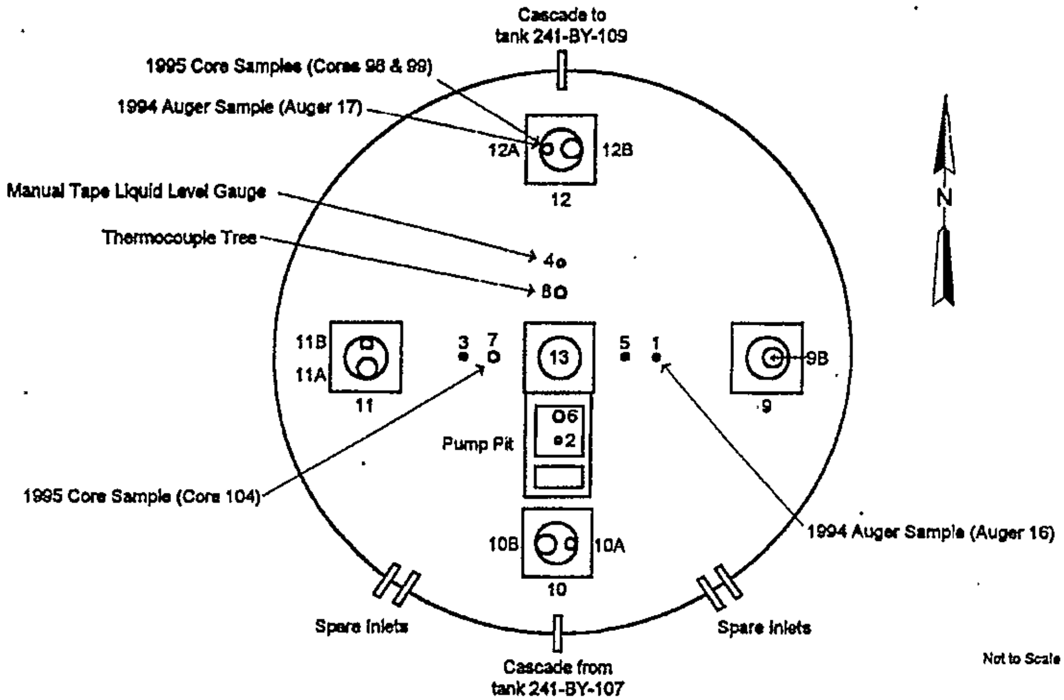
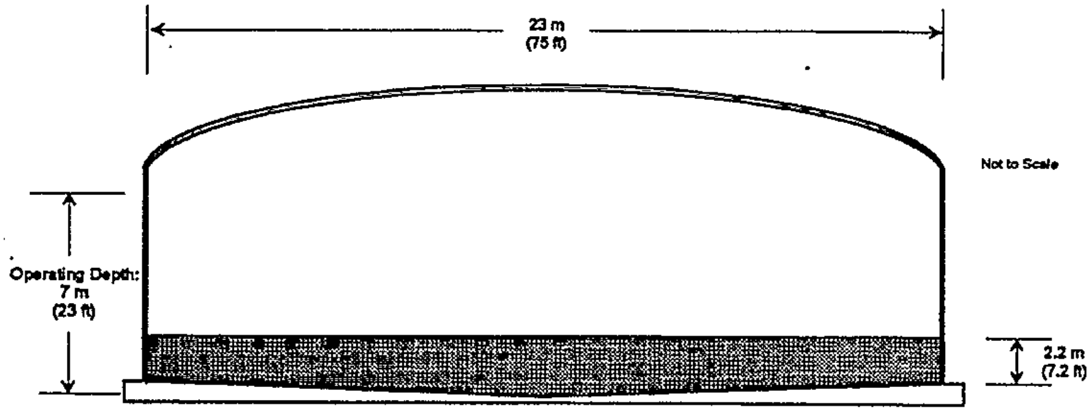
Figure ES-1. Profile of Tank 241-BY-108.





Total Tank Volume:	2,870 kL (758 kgal)
Waste Volume (October 1995):	863 kL (228 kgal)
Supernate Volume (October 1995):	0 kL (0 kgal)
Sludge Volume (October 1995):	583 kL (154 kgal)
Saltcake Volume (October 1995):	280 kL (74 kgal)

The characterization of tank 241-BY-108 is based on a core sampling event that took place from July 27 through August 16, 1995. Historical sampling data for the top 50.8 cm (20 in.) of waste were obtained from a 1994 auger sampling event. During the 1995 sampling event, cores 98, 99, and 104 were obtained from tank 241-BY-108 using the rotary core sampling method. All three cores were extruded at the Westinghouse Hanford Company 222-S Laboratory. Cores 98 and 104 were analyzed at the 222-S Laboratory in accordance with the *Tank Safety Screening Data Quality Objective* (Babad et al. 1995), the *Interim Data Quality Objectives for Waste Pretreatment and Vitrification* (Kupfer et al. 1994), the *Data Requirements for the Ferrocyanide Safety Issue Developed through the Data Quality Objectives Process* (Meacham et al. 1994), and the *Test Plan for Samples From Hanford Waste Tanks 241-BY-103, BY-104, BY-105, BY-106, BY-108, BY-110, TY-103, U-105, U-107, U-108, and U-109* (Meacham 1995). Although not addressed in the sampling and analysis plan, the analyses required by the *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue* (Turner et al. 1995) were performed as a consequence of meeting the analytical requirements of the other DQOs and the test plan. Analyses for cores 98 and 104 included determinations for total alpha activity, metals, cyanide, anions, total organic carbon, and an organic screen analysis (Baldwin 1995c). In addition, the energetics and moisture content were determined.

Core 99, obtained from the same riser as core 98, was sent to the Pacific Northwest National Laboratory for analyses in accordance with the safety screening DQO (Babad et al. 1995) and the *Historical Model Evaluation Data Requirements* (Simpson and McCain 1995). These

Waste surface levels have remained constant between 218 cm (86 in.) and 225 cm (88.5 in.) over the past three years.

An historical evaluation was performed on core 99 results as prescribed in the historical DQO (Simpson and McCain 1995). The fingerprint analytes, identified in the DQO for the waste type (ferrocyanide waste) predicted to compose the lower layer of the tank waste, were bismuth, nickel, sodium, ^{137}Cs, ^{90}Sr, and water. Comparisons were made between the analytical results and the DQO-defined concentration levels for these analytes. Results for all fingerprint analytes, except for bismuth, met the criterion of $\geq$ 10 percent of the concentration level predicted in the historical DQO.

Table ES-2 provides concentration and inventory estimates for the most prevalent analytes and analytes of concern based on the 1995 analytical results.

Table ES-2. Major Analytes and Analytes of Concern.[1]

Metals	Overall Mean Concentration µg/g	Relative Standard Deviation[2] (%)	Projected Inventory kg
Aluminum	39,800	29.8	51,700
Chromium	255	34.7	332
Iron	7,190	52.8	9,350
Nickel	2,510	41.8	3,260
Sodium	1.63E+05	14.2	2.12E+05
Uranium	9,470	60.0	12,300
Anions	µg/g	%	kg
Cyanide	362	65.8	471
Fluoride	6,610	26.7	8,590
Nitrate	2.01E+05	18.5	2.61E+05
Nitrite	27,300	13.0	35,500
Oxalate	7,500	11.4	9,750
Phosphate	26,000	24.0	33,800
Sulfate	22,900	27.5	29,800
Radionuclides	µCi/g	%	Ci
^{137}Cs	258	77.9	3.35E+05
^{90}Sr	143	95.5	1.86E+05
Total Alpha	0.0619	43.3	80.5
Carbon	µg C/g	%	kg C
Total Inorganic Carbon	5,340	33.9	6,940
Total Organic Carbon	4,480	20.5	5,820
Physical Properties			
Density	1.51 g/mL	---	
Percent Water	27.2	19.3	

Notes:

[1]Baldwin (1995b) and Silvers et al. (1995)

[2]Overall relative standard deviation of all available results for subsegments and cores as listed in Appendix A.

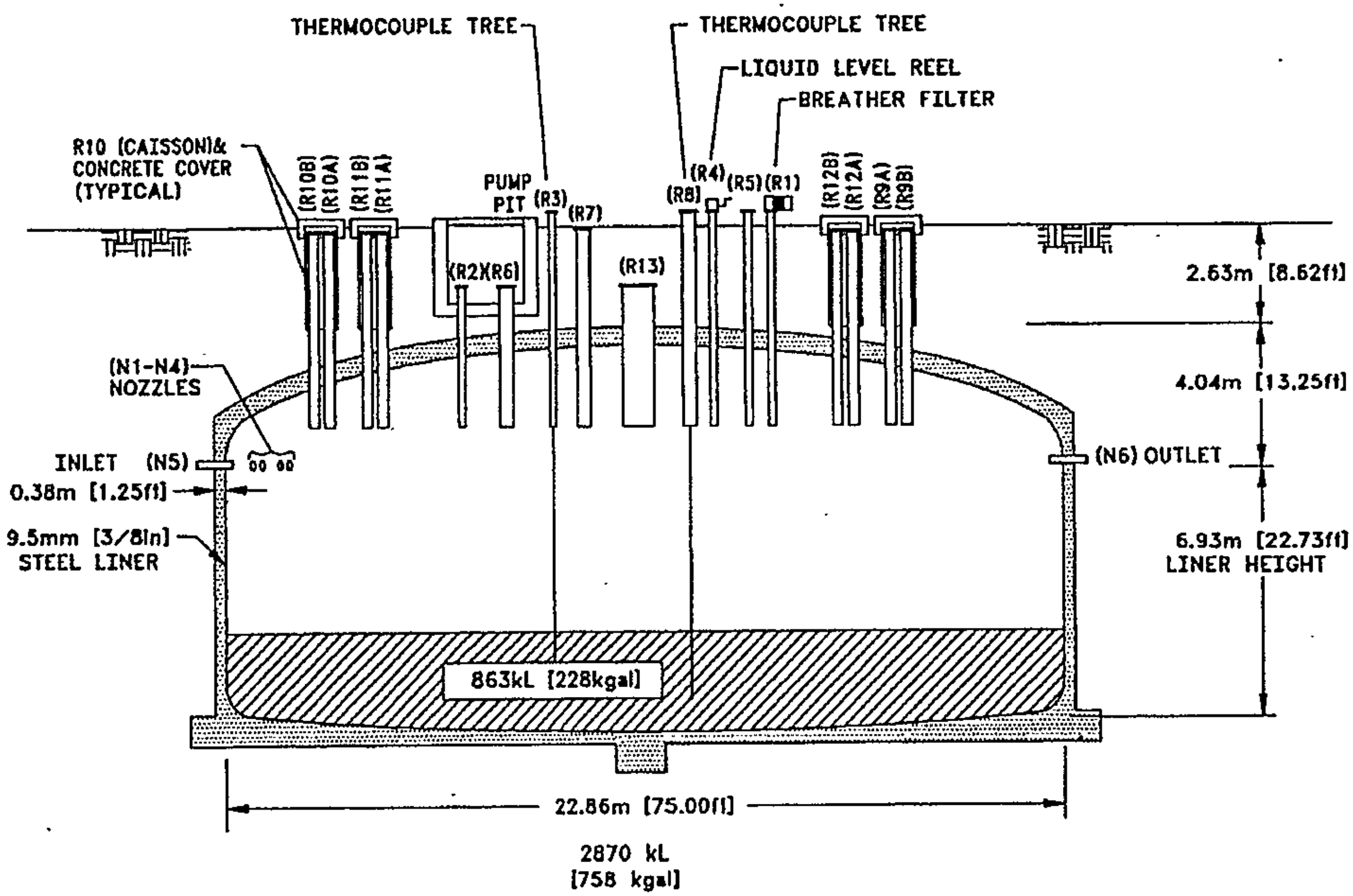


Figure 2-2. Tank 241-BY-108 Configuration.

2.3 PROCESS KNOWLEDGE

The subsections below provide information about the transfer history of tank 241-BY-108, describe the process wastes that made up the transfers, and give an estimate of the current tank contents based on transfer history.

2.3.1 Waste Transfer History

Initially, tank 241-BY-108 received first-cycle decontamination waste that cascaded from tank 241-BY-107 during March 1951. This waste originated during the $BiPO_4$ process for processing and recovery of plutonium. This waste type was cascaded until 1954. From 1954 until 1957, tank 241-BY-108 received in-plant ferrocyanide-scavenged uranium recovery waste. (Tank 241-BY-108 was a primary settling tank.) Ferrocyanide was added to the uranium recovery waste to precipitate cesium. After settling, the supernatant liquid (by this time relatively free of cesium) was transferred from tank 241-BY-108 to various cribs. The precipitation of cesium was used to reduce the volume of the stored tank waste. During 1957, tank 241-BY-108 also received in-tank ferrocyanide-scavenged uranium recovery waste (supernatant) from tank 241-C-112 (another primary settling tank). During 1959, tank 241-BY-108 received waste from tank 241-C-105.

In 1968, tank 241-BY-108 received in-tank solidification waste from tank 241-BY-111. From 1969 until 1974, tank 241-BY-108 received evaporator bottoms waste (from the in-tank solidification process), cladding waste, and organic wash waste from tank 241-BY-109. In 1970 and 1971, tank 241-BY-108 also received in-tank solidification waste. Finally, 27 kL (7 kgal), 61 kL (16 kgal) and 8 kL (2 kgal) of water were intermittently added to tank 241-BY-108 from 1972 until 1975. It should be noted that BY saltcake waste, as indicated by the *Waste Status and Transaction Record Summary for the Northeast Quadrant* (WSTRS) (Agnew et al. 1995b), was added to tank 241-BY-108 in 1976. This transaction can be viewed as a redesignation of a part of tank 241-BY-108's waste volume to BY saltcake waste. Approximately 863 kL (228 kgal) of waste was left in tank 241-BY-108 after the final transfer out of the tank in 1982. Table 2-3 summarizes tank 241-BY-108 waste receipt history. It does not include water additions.

Table 2-3. Summary of Tank 241-BY-108 Waste Receipt History.[1,2] (2 sheets)

Transfer Source	Waste Type Received	Time Period	Waste Volume Kiloliters	Waste Volume Kilogallons
241-BY-107	First-cycle decontamination waste	1951 - 1954	5,485	1,449
U Plant	In-plant ferrocyanide-scavenged uranium recovery waste	1954 - 1957	33,105	8,745
241-C-112	In-tank ferrocyanide-scavenged uranium recovery waste	1957	1,878	496

Table 4-2. Chemical Data Summary for Tank 241-BY-108 (4 sheets).

Analyte	Overall Mean Concentration	Relative Standard Deviation	Projected Inventory
METALS (Cont'd)	µg/g	%	kg
Boron	250	70.2	325
Cadmium	<16.3	n/a	< 21.2
Calcium	3,370	42.6	4,380
Cerium	< 123	n/a	< 160
Chromium	255	34.7	332
Cobalt	34.2	22.7	44.5
Copper	< 45.9	n/a	< 59.7
Dysprosium	< 69.4	n/a	< 90.2
Europium	< 139	n/a	< 181
Iron	7,190	52.8	9,350
Lanthanum	< 67.4	n/a	< 87.6
Lead	439	43.3	571
Magnesium	447	31.7	581
Manganese	209	61.5	272
Molybdenum	< 54.1	n/a	< 70.3
Neodymium	< 119	n/a	< 155
Nickel	2,510	41.8	3,260
Palladium	< 413	n/a	< 537
Phosphorus	10,100	31.4	13,100
Potassium	2,650	54.2	3,450
Rhodium	< 417	n/a	< 542
Samarium	< 131	n/a	< 170
Selenium[1]	< 135	n/a	< 176
Silicon	1,530	51.4	1,990
Silver	< 49.9	n/a	< 64.9
Sodium	1.63E+05	14.2	2.12E+05
Strontium	3,190	66.2	4,150
Sulfur	6,960	30.2	9,050
Tellurium[1]	< 694	n/a	< 902
Thallium[1]	< 479	n/a	< 623

Table 4-2. Chemical Data Summary for Tank 241-BY-108 (4 sheets).

Analyte	Overall Mean Concentration	Relative Standard Deviation	Projected Inventory
METALS (Cont'd)	µg/g	%	kg
Thorium	< 1,110	n/a	< 1,440
Tin	<1,390	n/a	< 1,810
Titanium	74.9	29.8	97.4
Tungsten	< 744	n/a	< 967
Uranium	9,470	60.0	12,300
Vanadium	< 47.3	n/a	< 61.5
Yttrium	< 14.4	n/a	< 18.7
Zinc	83.5	33.4	109
Zirconium	< 34.7	n/a	< 45.1
ANIONS	µg/g	%	kg
Chloride	1,540	9.66	2,000
Cyanide	362	65.8	471
Fluoride	6,610	26.7	8,590
Nitrate	2.01E+05	18.5	2.61E+05
Nitrite	27,300	13.0	35,500
Oxalate	7,500	11.4	9,750
Phosphate	26,000	24.0	33,800
Sulfate	22,900	27.5	29,800
RADIONUCLIDES	µCi/g	%	Ci
^{241}Am	< 0.187	n/a	< 243
^{134}Cs	< 0.108	n/a	< 140
^{137}Cs	258	77.9	3.35E+05
^{60}Co	< 0.00911	n/a	< 11.8
^{154}Eu	< 0.0455	n/a	< 59.2
^{155}Eu	< 0.389	n/a	< 506
^{238}Pu	0.00659	45.7	8.57
$^{239/240}Pu$	0.0459	91.5	59.7
^{90}Sr	143	95.5	1.86E+05
Total Alpha	0.0619	43.3	80.5
Total Beta	549	88.1	7.14E+05

The analytical phosphorus mean result as determined by ICP was 10,100 μg/g, which converts to 31,000 μg/g of phosphate. This compares well with the IC phosphate mean result of 26,000 μg/g. The RPD between these two phosphate estimates was a reasonable 18 percent.

The ICP sulfur value of 6,960 μg/g converts to 20,100 μg/g of sulfate. This compares favorably with the IC sulfate result of 22,900 μg/g. The RPD between these two sulfate estimates was a reasonable 13 percent.

A comparison was made between the gross beta and gross alpha activities with the sum of the individual beta and alpha emitters. The sum of the activities of the individual alpha emitters is usually determined by adding ^{241}Am and plutonium isotope activities. However, because ^{241}Am was not detected, it was not included in the calculation. The activity sum was therefore derived by the following equation:

$$\text{Sum of alpha emitters} = {}^{238}\text{Pu} + {}^{239/240}\text{Pu}$$

The activities of the individual beta emitters were summed as follows:

$$\text{Sum of beta emitters} = (2 * {}^{90}\text{Sr}) + {}^{137}\text{Cs}$$

Since ^{90}Sr is in equilibrium with its daughter product ^{90}Y, the radiochemically measured value for ^{90}Sr alone must be multiplied by 2 in order to obtain comparable numbers with total beta. The comparisons are shown in Tables 5-1 and 5-2. The total alpha activity and total beta RPDs of 16 and 1 percent, respectively, indicate the different analytical results correlate fairly well.

Table 5-1. Tank 241-BY-108 Comparison of Gross Alpha Activities With the Total of the Individual Activities.

Analyte	Half-Life (years)	Overall Mean (μCi/g)
^{238}Pu	87.8	0.00659
$^{239/240}$Pu	24,100 (^{239}Pu)	0.0459
Sum of alpha emitters		0.0525
Gross alpha		0.0619
Relative percent difference		16%

Table 5-2. Tank 241-BY-108 Comparison of Gross Beta Activities With the Total of the Individual Activities.

Analyte	Half-Life (years)	Overall Mean (μCi/g)	Beta Activities (μCi/g)
^{90}Sr	28.6	143	286
^{137}Cs	30.17	258	258
Sum of beta emitters		---	544
Gross Beta			549
Relative percent difference			1%

5.1.3.2 Homogenization Test. To evaluate the adequacy of the laboratory homogenization procedure on the samples taken from core 99, segment 1 and quarter segment 4B were homogenized, and subsamples were taken from the top and bottom. Each subsample was analyzed in duplicate by ICP and gamma energy analysis, and a total of 15 analytes were evaluated (Silvers et al. 1995). The resulting RPDs between the average of the top and bottom samples ranged from 1.1 to 19.0 percent. This indicates that a fair degree of sample homogenization was achieved for these samples, and that sample heterogeneity for the remainder of the analytes may not be a primary source of error in estimating analyte concentrations. However, some analytes may be in a chemical or physical form that would prevent them from being effectively homogenized, and any analyte near the detection limit may have large RPDs regardless of sample homogenization efficiency.

5.1.3.3 Mass and Charge Balance. The principle objective in performing a mass and charge balance is to determine whether the measurements were self-consistent. In calculating the balances, only analytes listed in Table 4-2, which were detected at a concentration of 5,000 μg/g or greater, were considered.

With the exception of sodium, all cations listed in Table 5-3 were assumed to be in their most common hydroxide or oxide form, and the concentrations of the assumed species were calculated stoichiometrically. Because precipitates are neutral species, all positive charge was attributed to the sodium cation. The acetate and carbonate data were derived from the total organic carbon and total inorganic carbon analyses, respectively. The other anionic analytes listed in Table 5-4 were assumed to be present as sodium salts and were expected to balance the positive charge exhibited by the cations. Sulfur is considered to be present as the sulfate ion and phosphorus as the phosphate ion. Both species are assumed to be completely water soluble and appear only in the anion mass and charge calculations (see Section 5.1.3.1). The concentrations of the cationic species in Table 5-3, the anionic species in Table 5-4, and the percent water were ultimately used to calculate the mass balance. The uncertainty estimates (RSDs) associated with each analyte and the uncertainty for the cation and anion totals also are given in the tables.

Table 5-3. Cation Mass and Charge Data.

Analyte	Concentration ($\mu g/g$)	Assumed Species	Concentration of Assumed Species ($\mu g/g$)	RSD (Mean) (%)	Charge ($\mu eq/g$)
Aluminum	39,800	$Al(OH)_3$	1.15E+05	29.8	0
Iron	7,190	FeO(OH)	11,400	52.8	0
Sodium	1.63E+05	Na^+	1.63E+05	14.2	7,090
Uranium	9,470	U_3O_8	11,200	60.0	0
Totals			3.01E+05	14.0	7,090

Notes:

$\mu g/g$ = microgram per gram
$\mu eq/g$ = microequivalent per gram
RSD (Mean) = relative standard deviation of the mean

Table 5-4. Anion Mass and Charge Data.

Analyte	Concentration ($\mu g/g$)	RSD (Mean) (%)	Charge ($\mu eq/g$)
Acetate (TOC)[1]	11,000 (4,480)	20.5	186
Carbonate (TIC)[1]	26,700 (5,340)	33.9	890
Fluoride	6,610	26.7	348
Nitrate	2.01E+05	18.5	3,240
Nitrite	27,300	13.0	593
Oxalate	7,500	11.4	170
Phosphate	26,000	24.0	821
Sulfate	22,900	27.5	477
Totals	3.29E+05	12.0	6,730

Note:

[1]The values in parentheses are from the TOC and TIC analytical results and were used to derive the acetate and carbonate values on the left.

The mass balance was calculated from the formula below. The factor 0.0001 is the conversion factor from $\mu g/g$ to weight percent.

Mass balance = % Water + 0.0001 x {Total Analyte Concentration}
= % Water + 0.0001 x $\{Al(OH)_3 + FeO(OH) + Na^+ + U_3O_8 + C_2H_3O_2^- + CO_3^{-2} + F^- + NO_3^- + NO_2^- + (COO)_2^{-2} + PO_4^{-3} + SO_4^{-2}\}$

The total analyte concentrations calculated from the above equation was 630,000 $\mu g/g$. The mean weight percent water obtained from thermogravimetric analysis reported in Table 4-2 is 27.2 percent. The mass balance resulting from adding the percent water to the total analyte concentration is 90.2 percent (see Table 5-5).

The following equations demonstrate the derivation of total cations and total anions; the charge balance is the ratio of these two values.

Total cations (microequivalents) = $Na^+/23.0$ = 7,090 microequivalents

Total anions (microequivalents) = $C_2H_3O_2^-/59.0 + CO_3^{-2}/30.0 + F^-/19.0 + NO_3^-/62.0 + NO_2^-/46.0 + (COO)_2^{-2}/44.0 + PO_4^{-3}/31.7 + SO_4^{-2}/48.1$ = 6,730 microequivalents

The charge balance obtained by dividing the sum of the positive charge by the sum of the negative charge was 1.05.

In summary, the above calculations yield reasonable mass and charge balance values (close to 1.00 for charge balance and 100 percent for mass balance), indicating that the mean analytical results for the tank were fairly self-consistent.

Table 5-5. Mass Balance Totals.

	RSD (Mean) (%)	Concentrations ($\mu g/g$)
Total from Table 5-3 (cations)	14.0	3.01E+05
Total from Table 5-4 (anions)	12.0	3.29E+05
Water %	19.3	2.72E+05
Grand Total	8.7	9.02E+05

Table 5-7. Comparison of Historical Data With 1995 Analytical Results for Tank 241-BY-108 (2 sheets).

Analyte	1995 Analytical Result	HTCE[1] Estimate	Relative Percent Difference
METALS	µg/g	µg/g	%
Aluminum	39,800	4,670	158
Calcium	3,370	3,570	6
Chromium	255	790	102
Iron	7,190	40,600	140
Lead	439	5.8	195
Nickel	2,510	3,510	33
Potassium	2,650	233	168
Silicon	1,530	6,210	121
Sodium	163,000	124,000	27
Uranium	9470	963	163
IONS	µg/g	µg/g	%
Cl^-	1,550	1,220	24
CN^-	362	8,240[2]	183
F^-	6,660	4,580	37
NO_3^-	201,000	126,000	46
NO_2^-	27,200	9,430	97
PO_4^{-3}	25,700	18,800	31
SO_4^{-2}	22,900	92,500	121

Table 5-7. Comparison of Historical Data With 1995 Analytical Results for Tank 241-BY-108 (2 sheets).

Analyte	1995 Analytical Result	HTCE[1] Estimate	Relative Percent Difference
RADIONUCLIDES	μCi/g	μCi/g	%
^{137}Cs	258	107	83
^{238}Pu + $^{239/240}$Pu	0.0525	0.0425 (Pu)	21
^{90}Sr	143	6.32	183
PHYSICAL PROPERTIES	g/mL	g/mL	%
Percent Water	27.2	45.8	51
CARBON	μg C/g	μg C/g	%
Total Inorganic Carbon	5,340	1,370	118
Total Organic Carbon	4,480	4,180	7

Notes:

[1]Brevick et al. (1994a).

[2]This value is converted from the HTCE $Fe(CN)_6^{4-}$ concentration of 0.0845 moles/L using the HTCE density value of 1.6 g/mL.

Comparing the HTCE with the analytical values produced varied results. A total of 22 analytes were compared. Nine analytes (calcium, nickel, sodium, chloride, fluoride, nitrate, phosphate, total plutonium, and TOC) exhibited RPDs less than 50 percent. Of these, two analytes (calcium and TIC) exhibited RPDs less than 10 percent. Five analytes (aluminum, lead, potassium, uranium, and ^{90}Sr) exhibited RPDs greater than 150 percent. The RPDs for the remaining analytes were in between these two extremes.

Other observations can be made by qualitatively comparing analytical results with the predicted waste type constituents. Aluminum is predicted to be found in higher quantities in the BY saltcake than in the ferrocyanide waste. In reviewing the subsegment analytical results in Appendix A, aluminum was found in higher concentrations in the upper segments. Analytes (bismuth, nickel, and iron) characteristic of PFeCN1 and PFeCN2, ferrocyanide sludges, were found in higher concentrations in the lower segments as expected.

5.5 EVALUATION OF PROGRAM REQUIREMENTS

The two 1995 tank 241-BY-108 core samples analyzed at the 222-S Laboratory were acquired to meet the requirements of the safety screening DQO (Babad et al. 1995), the ferrocyanide DQO (Meacham et al. 1994), the pretreatment DQO (Kupfer et al. 1994), and the safety program test plan (Meacham 1995). The core sample analyzed at the Pacific Northwest National Laboratory was governed by the safety screening DQO and the historical

Table A-53. Tank 241-BY-108 Analytical Results: Sulfate (2 sheets).

Sample Number	Core: Segment	Sub-segment	Result	Duplicate	Mean	Overall Mean	RSD (mean)	Projected Inventory
			μg/g	μg/g	μg/g	μg/g	%	kg
2484	98:1	Whole	6,660	5,760	6,210[5]	22,900	27.5	29,800
1373		DL	< 6,920 μg/mL	< 6,920 μg/mL	< 6,920 μg/mL (4,840 μg/g)			
2490	98:2	A	11,600	11,600	11,600			
1427		DL	< 6,920 μg/mL	< 6,920 μg/mL	< 6,920 μg/mL (4,840 μg/g)			
2491		C	39,900	22,000	30,900[5]			
2492		D	30,700	59,400	45,000[5]			
2493	98:3	A	43,000	50,700	46,800[5]			
1430		DL	< 6,920 μg/mL	< 6,920 μg/mL	< 6,920 μg/mL (4,840 μg/g)			
2494		C	56,700	62,700	59,700[5]			
2495		D	130,000	117,000	124,000[5]			
2496	98:4	A	41,000	29,700	35,400[5]			
2497		B	1.50E+05	12,400	81,200[3,5]			
2498		C	6,380	7,060	6,720[5]			
3707		D	4,480	12,000	8,420[5]			
7941	99:1	Whole	1,300	1,100	1,200[5,6]			
7942	99:2	A	900	900	900			
7932		DL	1,100 μg/mL	1,000 μg/mL	1,100 μg/mL (734 μg/g)			
7943		D	9,800	9,500	9,650			

Table A-53. Tank 241-BY-108 Analytical Results: Sulfate (2 sheets).

Sample Number	Core: Segment	Sub-segment	Result	Duplicate	Mean	Overall Mean	RSD (mean)	Projected Inventory
			µg/g	µg/g	µg/g	µg/g	%	kg
7944	99:3	A	19,600	15,400	17,500[5]	Cont'd	Cont'd	Cont'd
7935		DL	1,600 µg/mL	1,600 µg/mL	1,600 µg/mL (1,120 µg/g)			
7945	99:4	A	57,800	21,400	39,600[5]			
7946		B	6,000	4,000	5,000[5]			
7947		C	15,000	17,000	16,000[5]			
7948		D	21,000	9,000	15,000[5]			
2536	104:1	Whole	< 1,680	5,840	3,760[3]			
2558	104:2	A	15,100	10,100	12,600[5]			
2559		B	19,800	19,800	19,800			
2560		C	18,000	16,400	17,200			
2561	104:3	A	11,300	12,000	11,600			
2562		C	8,990	5,880	7,440[5]			
2563		D	27,900	29,000	28,400			
2564	104:4	A	25,700	29,300	27,500[5]			
2565		C	48,600	48,500	48,600			
2566		D	86,400	88,000	87,200			
2568	104:5	A	1.16E+05	1.03E+05	1.10E+05			
2569		B	34,200	28,900	31,600[5]			
2570		C	25,300	24,400	24,800			
2571		D	2,960	2,600	2,780[5]			

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